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WELLS ST. JOHN P.S.  
601 W. FIRST  
SUITE 1300  
SPOKANE, WA 99201-3828

EXAMINER

FULLER, ERIC B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 05 20 2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

1.11-9

# Office Action Summary

Application No.

09/905,320

Applicant(s)

BASCERI ET AL.

Examiner

Eric B Fuller

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 February 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8, 17-22 and 52-65 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 17-22 and 52-65 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO 1449) Paper No(s) 5, 7 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 17-22, and 52-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senzaki et al. (US 6,238,734 B1) in view of Xiang et al. (US 6,146,907) in further view of Kang (US 6,127,218).

Senzaki teaches a method for producing mixed metal compound layers on substrates such as integrated circuits (abstract; column 5, lines 5-10). The layers are deemed to include metal oxide layers comprising barium, strontium, calcium, and titanium, among others (column 3, line 57; column 4, lines 15-25). These metals are provided to a chemical vapor deposition reactor in the form of precursors under conditions effective to deposit a BST layer. The reference teaches that a direct liquid injection is the preferred method of delivering precursors to the reactor (column 5, lines 15-25), because it delivers the same ratio of constituents to the reactor as are in the source container. It is the examiner's position that since no steps are disclosed to alter the composition of the mixture in the source container, that the reference reads on supplying the precursors at a substantially constant atomic ratio of barium to strontium. Suitable oxidizers that are supplied to the reactor are oxygen, ozone, nitrous oxide,

Art Unit: 1762

nitric oxide, nitrogen dioxide, water, hydrogen peroxide, air, and mixtures thereof (column 3, lines 40-43). Since single oxidizers are permitted by the reference, this reads on a constant composition oxidizer stream. The reference fails to teach to change the oxidizer flow rate at least once to effect a change in relative atomic concentration of the metals in the deposited film.

However, Xiang teaches that barium-strontium-calcium-titanate films are known in the art to be utilized for DRAM devices. When being used for such devices, it is desirable to have a low dielectric loss or leakage and a high dielectric constant in the film (column 3, lines 33-50). It is taught that these benefits are achieved by having the composition of the mixed metal oxide film vary throughout the thickness of the film. Although the film of Xiang is deposited by means other than CVD, it would be realized from this reference by one of ordinary skill in the art that a dielectric film would have the benefits of lower leakage and higher dielectric constant by having the film be of a varied composition, regardless of the deposition method.

Additionally, Kang teaches that when depositing mixed metal oxide film that comprise strontium and titanium by a CVD method, that as one increases the  $N_2O$  flow rate, the concentration of strontium in the deposited film is increased (column 5, lines 10-15).

Therefore, it has been shown by Xiang that there is a motivation, when producing a film comprising barium, strontium, calcium, and titanium oxides, to have the film contain a varied composition of metallic species. Furthermore, Kang teaches that it is possible to achieve this varied concentration by only varying the amount of nitrogen

Art Unit: 1762

dioxide fed to the reactor. As Senzaki (the primary reference) teaches to use a direct liquid injection, with its property of providing constant composition of metal precursors, one of ordinary skill in the art would recognize that it would be easier to obtain the varied metallic composition by varying the oxidizer as opposed to adjusting the composition of the direct liquid injection feed. Therefore, when producing a mixed metal oxide film that comprises barium, strontium, calcium, and titanium by using nitrogen dioxide as the oxidizer, as is taught by Senzaki, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to change the flow rate of the nitrogen dioxide such that the composition of strontium in the deposited film is varied over the thickness of the film, as is taught by Kang. By doing so, one would reap the benefits of the deposited film having a lower dielectric leakage and a higher dielectric constant, which are desirable qualities, as taught by Xiang. By having the amount of strontium vary over the thickness of the film, the relative concentrations of all the metals in the film are varied with respect to the amount of total metals in the film.

As to claims 2, 19, 53, and 62, it is the examiner's position that one skilled in the art would recognize that the more times the oxidizing stream is changed, the more varied the concentration of the film would become. This would result in achieving higher dielectric constants and lower leakage. It would have been within the skill of one practicing in the art to optimize the amount of times the oxidizer stream is changed such that the desired dielectric constant is achieved with minimal dielectric leakage.

As to claims 4 and 55, the direct-liquid-injection delivery method taught by Senzaki acts to feed the reactor in a single flow stream (column 5, lines 15-25).

As to claims 5 and 56, it is the examiner's position that since it is not disclosed to alter the flow rate of the precursors during the deposition, that Senzaki reads on having the precursors being fed at a substantially constant flow rate throughout the deposition process.

As to claims 7, 8, 21, 22, 58, 59, 64, and 65, Kang teaches that  $\text{NO}_x$  may be used interchangeably with  $\text{N}_2\text{O}$  (column 3, line 1) as the oxidizer. Therefore, one skilled in the art would have a reasonable expectation that NO would behave in the same fashion as nitrogen dioxide and act to increase the amount of strontium in the film. Therefore, to use NO as the oxidizer in the method collectively taught by Senzaki, Xiang, and Kang would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success.

### ***Double Patenting***

Claims 1-8, 17-22, and 52-65 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 and 3 of copending Application No. 09/776,217. Although the conflicting claims are not identical, they are not patentably distinct from each other because by performing the methods of claims 1-8, 17-22, and 52-65 of the present applicant, the limitations of claims 1 and 3 of the previously filed application would be infringed. Differences that the present application has, such as changing the oxidizer flow a plurality of times and having the precursor streams be fed to the reactor by one stream, would have been obvious at the time the invention was made to a person having ordinary skill in the art.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Response to Arguments***

Applicant argues that Kang teaches to vary the composition of the oxidizer stream throughout the deposition of the film, wherein the claims have been amended to read that the composition of the oxidizer stream is to be constant throughout the deposition. Therefore, Kang fails to anticipate the claims as amended. Examiner agrees and has therefore dropped the previous rejection based on Kang. However, Kang, as used in the present rejections, teaches the concept of: as the amount of  $N_2O$  is increased (not relative amount), the amount of strontium in the deposited film is increased. Therefore, when one is using  $N_2O$  as the single oxidizer, as taught by Senzaki, one skilled in the art would be motivated to change the amount of  $N_2O$  being fed to the reactor, ultimately resulting in a higher dielectric constant and lower leakage (from the teaching in Xiang). The same argument is applicable for the use of NO as the oxidizer, which is also taught by Senzaki and Kang.

All other arguments have been considered, but are moot in view of the new grounds for rejection.

### ***Conclusion***

Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Applicant's submission of an information disclosure statement under

37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on January 3<sup>rd</sup>, 2002 prompted the provisional double-patenting rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Tuesday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and (703) 872-9311 for After Final communications.

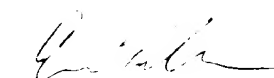
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Application/Control Number: 09/905,320

Page 8

Art Unit: 1762



EBF  
May 15, 2002



TIMOTHY MEEKS  
PRIMARY EXAMINER